

What is claimed is:

1. A network management system for managing a network, comprising:

5 a network decomposition unit which decomposes said network into network components;

a table management unit which manages information on decomposition of the network into said network components by tabulating the information on decomposition; and

10 a virtual-network generation unit which generates a virtual network as a new area to be managed, by combining said network components based on information managed by said table management unit.

15 2. The network management system according to claim 1, wherein said network decomposition unit decomposes said network into elements, and groups the elements into said network components, which include at least one core network and branch networks, and said  
20 virtual-network generation unit automatically generates said virtual network by combining ones of the branch networks.

3. The network management system according to  
25 claim 2, wherein said table management unit comprises,

a branch information table for managing information on structures of said branch networks,

a core information table for managing information on at least one structure of said at least one core network,

a connection information table for managing  
5 information on connections between the at least one core network and the branch networks, and

a virtual-network information table for managing information on a structure of said virtual network after generation of the virtual network.

10

4. The network management system according to claim 3, wherein said branch information table stores branch numbers indicating said branch networks, and said virtual-network generation unit automatically generates  
15 said virtual network by combining said ones of the branch networks when ones of the branch numbers corresponding to the ones of the branch networks are externally designated.

20 5. The network management system according to claim 2, wherein said virtual-network generation unit generates subnetwork connections in one of said at least one core network which are necessary for generation of said virtual network, in such a manner that the  
25 subnetwork connections share no link.

6. The network management system according to

claim 2, wherein said table management unit further comprises a protection information table which contains information on protection of channels between nodes in the at least one core network, and said virtual-network generation unit generates subnetwork connections by preferentially selecting ones of the channels which are not protected, based on the protection information table.

7. The network management system according to claim 2, wherein when a branch network is added to said virtual network, said virtual-network generation unit changes a structure of the virtual network by determining at least one path in the virtual network which is affected by addition of the branch network, switching said at least one path to at least one other path, changing subnetwork connections in one of said at least one core network after the switching, and thereafter making settings for connecting paths to nodes in the added branch network.

20

8. The network management system according to claim 2, wherein when a branch network is removed from said virtual network, said virtual-network generation unit changes a structure of the virtual network by determining at least one path in the virtual network which is affected by removal of the branch network, switching said at least one path to at least one other

path, changing subnetwork connections in one of said at least one core network after the switching, and thereafter removing subnetwork connections related to said at least one path from nodes in the removed branch  
5 network.

9. The network management system according to claim 3, wherein when a node is added to a branch network in said virtual network, said virtual-network  
10 generation unit changes a structure of the virtual network by determining at least one path in the virtual network which is affected by addition of the node, switching said at least one path to at least one other path, thereafter making settings for connecting paths to  
15 the added node, and adding information on the added node to said branch information table.

10. The network management system according to claim 3, wherein when a node is removed from a branch  
20 network in said virtual network, said virtual-network generation unit changes a structure of the virtual network by determining at least one path in the virtual network which is affected by removal of the node, switching said at least one path to at least one other  
25 path, and thereafter removing information on the removed node from said branch information table.

11. The network management system according to claim 2, further comprising a virtual-network display unit which displays said virtual network by generating virtual lines based on connections between nodes in said ones of branch networks and subnetwork connections in one of said at least one core network which connect the ones of branch networks.

12. The network management system according to claim 11, wherein when a trouble occurs in a link, and a failure of a subnetwork connection is detected, said virtual-network display unit displays information on the failure with one of said virtual lines corresponding to the subnetwork connection.

15

13. A virtual-network generation method for generating a virtual network in a network, comprising the steps of:

(a) decomposing said network into network components;

(b) tabulating information on decomposition of the network into said network components; and

(c) generating said virtual network as a new area to be managed, by combining said network components based on said information tabulated in step (b).

14. The virtual-network generation method

according to claim 13, wherein in step (a), said network is decomposed into elements, and the elements are grouped into said network components, which include at least one core network and branch networks, and

5                   in step (c), said virtual network is automatically generated by combining ones of the branch networks.

15.     The virtual-network generation method  
10 according to claim 14, wherein said information on decomposition is managed by using,

          a branch information table for managing information on structures of said branch networks,

          a core information table for managing  
15 information on at least one structure of said at least one core network,

          a connection information table for managing information on connections between the at least one core network and the branch networks, and

20                   a virtual-network information table for managing information on a structure of said virtual network after generation of the virtual network.

16.     The virtual-network generation method  
25 according to claim 15, wherein said branch information table stores branch numbers indicating said branch networks, and in step (c) said virtual network is

automatically generated by combining said ones of the branch networks when ones of the branch numbers corresponding to the ones of the branch networks are externally designated.

5

17. The virtual-network generation method according to claim 14, wherein in step (c), subnetwork connections in one of said at least one core network which are necessary for generation of said virtual network are generated in such a manner that the subnetwork connections share no link.

18. The virtual-network generation method according to claim 14, wherein in step (c), subnetwork connections are generated by preferentially selecting ones of the channels which are not protected, based on a protection information table which contains information on protection of channels between nodes in the at least one core network, and said virtual-network generation unit.

19. The virtual-network generation method according to claim 14, wherein when a branch network is added to said virtual network, a structure of the virtual network is changed by determining at least one path in the virtual network which is affected by addition of the branch network, switching said at least

one path to at least one other path, changing subnetwork connections in one of said at least one core network after the switching, and thereafter making settings for connecting paths to nodes in the added branch network.

5

20. The virtual-network generation method according to claim 14, wherein when a branch network is removed from said virtual network, a structure of the virtual network is changed by determining at least one  
10 path in the virtual network which is affected by removal of the branch network, switching said at least one path to at least one other path, changing subnetwork connections in one of said at least one core network after the switching, and thereafter removing subnetwork  
15 connections related to said at least one path from nodes in the removed branch network.

21. The virtual-network generation method according to claim 15, wherein when a node is added to a  
20 branch network in said virtual network, a structure of the virtual network is changed by determining at least one path in the virtual network which is affected by addition of the node, switching said at least one path to at least one other path, thereafter making settings  
25 for connecting paths to the added node, and adding information on the added node to said branch information table.



22. The virtual-network generation method according to claim 15, wherein when a node is removed from a branch network in said virtual network, a  
5 structure of the virtual network is changed by determining at least one path in the virtual network which is affected by removal of the node, switching said at least one path to at least one other path, and thereafter removing information on the removed node from  
10 said branch information table.

23. The virtual-network generation method according to claim 14, further comprising a step of displaying said virtual network by generating virtual  
15 lines based on connections between nodes in said ones of branch networks and subnetwork connections in one of said at least one core network which connect the ones of branch networks.

20 24. The virtual-network generation method according to claim 23, wherein when a trouble occurs in a link, and a failure of a subnetwork connection is detected, information on the failure is displayed with one of said virtual lines corresponding to the  
25 subnetwork connection.